

PATENT SPECIFICATION

DRAWINGS ATTACHED

KOPIE

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COMPLETE SPECIFICATION

Improvements in or relating to methods of Securing Inserts in Sheet Material

We, BELLING & LEE LIMITED, a British Company of Great Cambridge Road, Enfield, Middlesex, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a method of securing an insert in sheet material and particularly to securing a substantially rigid insert in a substantially rigid sheet material.

In Patent Specification No. 869,037 there is described a method of securing a substantially rigid insert in a substantially rigid sheet of material which method includes the steps of contacting a leading face of the insert with a face of the sheet material and subjecting the insert and sheet material to the action of a pressure applying device and die with the insert interposed between the pressure applying device and sheet. The die and leading face of the insert are each formed with a cutting edge of substantially the same contour so that on pressure being applied to the insert by the pressure applying device the two cutting edges co-operate to shear from the sheet material a piece of material with substantially the same contour as the cutting edge of the insert. At the same time at least a part of the insert following the cutting edge is forced into the place of the sheared out piece of material, this following part of the insert having its exterior peripheral wall so formed as to key to the walls bounding the aperture in the sheet material as a result of shearing out a piece of material.

In one embodiment of the above mentioned invention the leading face of the insert is separated from the following part of the insert by a smooth walled part of uniform cross section, for example by a cylindrical part. Also it is preferred to make the length of the following part slightly larger than the thickness of

the sheet material and to so form the die that it sets on the following parts to peen the end of the following part of the insert nearest the cutting edge over the sheet material.

It is an object of the present invention to provide a development which avoids peening of the end of the following part in the technique of Patent Specification No. 869,037.

According to one aspect of the present invention there is provided a method of securing a substantially rigid insert in a substantially rigid sheet of material which method includes the steps of contacting a leading face of the insert with a face of the sheet material and subjecting the insert and sheet material to the action of a pressure applying device and die with the insert interposed between the pressure applying device and sheet, the die and leading face of the insert being each formed with a cutting edge of substantially the same contour so that on pressure being applied to the insert by the pressure applying device the two cutting edges co-operate to shear from the sheet material a piece of material with substantially the same contour as the cutting edge of the insert and to force at least a part of the insert following the cutting edge thereof into the place of the sheared out piece of material, this following part being shorter than the thickness of the sheet material and separated from the leading face by a boss of smaller cross section than the largest cross section of the following part having a peripheral recess of such a formation that material displaced by the passage of the insert through the sheet material can flow back into the peripheral recess to assist in anchoring the insert in the sheet material, the following part of the insert also having its exterior peripheral wall so formed as to be capable of keying to the walls of the sheet material bounding the aperture in the sheet material formed as a result of shearing out a piece of material.

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According to another aspect of the present invention there is provided an article having at least a part thereof in the form of a substantially rigid insert capable of being secured in a substantially rigid sheet of material, the insert being formed with a leading face having a cutting edge capable of co-operating with a cutting edge of substantially the same contour forming part of a die so that when the leading face of the insert contacts a face of the rigid sheet of material and the article is subjected to the action of a pressure applying device and die with at least the insert interposed between the pressure applying device and sheet of material, pressure applied to the article by the pressure applying device causes a piece of material of substantially the same contour as the cutting edge of the insert to be sheared from the sheet material and at least part of the insert following the cutting edge thereof to be forced into the place of the piece of material, this following part being shorter than the thickness of the sheet material and separated from the leading face by a box of smaller cross section than the largest cross section of the following part having a peripheral recess of such a formation that material displaced by the passage of the insert through the sheet material can flow back into the peripheral recess to assist in anchoring the insert in the sheet material the following part of the insert also having its exterior peripheral wall so formed as to be capable of keying to the walls of the sheet material bounding the aperture in the sheet material formed as a result of shearing out a piece of material therefrom.

This technique is recommended for the mechanical fixing aspects discussed in patent specification 869,037. Its use is not recommended in the case of slotted inserts and inserts where the leading face is preceded into the sheet material by a spigot. It is also more relevant to heavy duty mechanical fixing such as securing metal inserts in metal sheets, such as for example steel plate or sheet, because a material such as steel would tend to relax more readily into the peripheral recess than would, say, a more brittle material such as a synthetic bonded laminate.

The preferred form of peripheral recess is a taper starting and being widest at the end of the following part nearest the leading face and terminating and being narrowest a short distance from the leading face. The narrowest part of the taper is preferably separated from the leading face by a smooth walled section of uniform cross section and comparable in extent to the widest part of the taper.

The invention will now be described with reference to the accompanying diagrammatic drawings in which:—

Fig. 1 is a sectional side elevation of a rivet in accordance with the present invention, and

Fig. 2 is a sectional side elevation of two pieces of sheet material secured together by

the rivet of Fig. 1.

The rivet of Fig. 1 is formed mainly in accordance with the invention of Patent Specification No. 869,037. It has a head 1, a first peripheral recess 2 between the head and knurled section or following part 3, a leading face 4 and a smooth walled section of smaller cross section than the longest cross section of the inverted part 5 and forming part of a boss on the end of the knurled part 3. Part 5 is between the leading face 4 and the knurled section 3. However in accordance with the present invention the boss on the end of knurled part 5 has additionally a second peripheral recess 6 between the smooth walled part 5 and the knurled section 3. It will be seen that the recess 6 tapers from the leading face end to the knurled section end. Such a rivet is inserted through two pieces 7, 8 of sheet material, for example sheet metal, making its own hole in the process by the technique as described in Patent Specification 869,037 and utilizing a punch and die. When inserted through the two sheets the rivet ultimately assumes the position shown in section in Fig. 2. It will be seen that as well as being fixed in the sheets by the annulus of material 9 in first recess 2 and by the knurl in section 3, a second annulus of material 10 exists as a result of material relaxing back into second recess 6, so that a three way fixing is obtained without the need for drilling holes in the sheet material.

WHAT WE CLAIM IS:—

1. A method of securing a substantially rigid insert in a substantially rigid sheet of material which method includes the steps of contacting a leading face of the insert with a face of the sheet material and subjecting the insert and sheet material to the action of a pressure applying device and die with the insert interposed between the pressure applying device and sheet, the die and leading face of the insert being each formed with a cutting edge of substantially the same contour so that on pressure being applied to the insert by the pressure applying device the two cutting edges co-operate to shear from the sheet material a piece of material with substantially the same contour as the cutting edge of the insert and to force at least a part of the insert following the cutting edge thereof into the place of the sheared out piece of material, this following part being shorter than the thickness of the sheet material and separated from the leading face by a boss of smaller cross section than the largest cross section of the following part having a peripheral recess of such a formation that material displaced by the passage of the insert through the sheet material can flow back into the peripheral recess to assist in anchoring the insert in the sheet material, the following part of the insert also having its exterior peripheral wall so formed as to be capable of keying to the walls of the sheet material bounding the

formed as a result of shearing out a piece of material.

2. An article having at least a part thereof in the form of a substantially rigid insert capable of being secured in a substantially rigid sheet of material, the insert being formed with a leading face having a cutting edge capable of co-operating with a cutting edge of substantially the same contour forming part of a die so that when the leading face of the insert contacts a face of the rigid sheet of material and the article subjected to the action of a pressure applying device and die with at least the insert interposed between the pressure applying device and sheet material, pressure applied to the article by the pressure applying device causes a piece of material of substantially the same contour as the cutting edge of the insert to be sheared from the sheet material and at least part of the insert following the cutting edge thereof to be forced into the place of the piece of material, this following part being shorter than the thickness of the sheet material and separated from the leading face by a boss of smaller cross section than the largest cross section of the following part having a peripheral recess of such a formation that material displaced by the passage of the insert through the sheet material can flow back into the peripheral recess to assist in anchoring the insert in the sheet material, the

following part of the insert also having its exterior peripheral wall so formed as to be capable of keying to the walls of the sheet material bounding the aperture in the sheet material formed as a result of shearing out a piece of material therefrom.

3. A method as claimed in Claim 1 or article as claimed in Claim 2 in which the peripheral recess is in the form of a taper starting and being widest at the end of the following part nearest the leading face and terminating and being narrowest a short distance from the leading face.

4. A method or article as claimed in Claim 3 in which the narrowest part of the taper is separated from the leading face by a smooth walled section of uniform cross section and comparable in extent to the widest part of the taper.

5. A method substantially as herein described.

6. An article substantially as herein described with reference to the accompanying drawing.

7. An arrangement of sheet material and articles when formed by the method claimed in any of the Claims 1 to 6.

For and on behalf of

BELLING & LEE LIMITED,

C. RUSSELL TOWNEND,
Director & Secretary.

PROVISIONAL SPECIFICATION

Improvements in or relating to methods of Securing Inserts in Sheet Material

We, BELLING & LEE LIMITED, a British Company of Great Cambridge Road, Enfield, Middlesex, do hereby declare this invention to be described in the following statement:—

This invention relates to a method of securing an insert in sheet material and particularly to securing a substantially rigid insert in a substantially rigid sheet material.

In co-pending Application No. 22268/58 (Serial No. 869,037) there is described a method of securing a substantially rigid insert in a substantially rigid sheet of material which method includes the steps of contacting a leading face of the insert with a face of the sheet material and subjecting the insert and sheet material to the action of a pressure applying device and die with the insert interposed between the pressure applying device and sheet. The die and leading face of the insert are each formed with a cutting edge of substantially the same contour so that on pressure being applied to the insert by the pressure applying device the two cutting edges co-operate to shear from the sheet material a piece of material with substantially the same contour as the cutting edge of the insert. At the same time at least a part of the insert fol-

lowing the cutting edge is forced into the place of the sheared out piece of material, this following part of the insert having its exterior peripheral wall so formed as to key to the walls bounding the aperture in the sheet material as a result of shearing out a piece of material.

In one embodiment of this invention the leading face of the insert is separated from the following part of the insert by a smooth walled part of uniform cross section, for example by a cylindrical part. Also it is preferred to make the length of the following part slightly larger than the thickness of the sheet material and to so form the die that it acts on the following parts topeen the end of the following part of the insert nearest the cutting edge over the sheet material.

It is an object of the present invention to provide an alternative to peening of the end of the following part in the technique of co-pending Application No. 22268/58 (Serial No. 869,037).

According to one aspect of the present invention there is provided a method of securing a substantially rigid insert in a substantially rigid sheet of material which method includes

the steps of contacting a leading face of the insert with a face of the sheet material and subjecting the insert and sheet material to the action of a pressure applying device and die with the insert interposed between the pressure applying device and sheet, the die and leading face of the insert being each formed with a cutting edge of substantially the same contour so that on pressure being applied to the insert by the pressure applying device the two cutting edges co-operate to shear from the sheet material a piece of material with substantially the same contour as the cutting edge of the insert and to force at least a part of the insert following the cutting edge thereof into the place of the sheared out piece of material, this following part of the insert having its exterior peripheral wall so formed as to key to the walls bounding the aperture in the sheet material as a result of shearing out a piece of material, and also being shorter than the thickness of the sheet material and separated from the leading face by a surface having a peripheral recess of such a formation that material displaced by the passage of the insert through the sheet material can flow back into the peripheral recess to assist in anchoring the insert in the sheet material.

According to another aspect of the present invention there is provided an article having at least a part thereof in the form of a substantially rigid insert capable of being secured in a substantially rigid sheet of material, the insert being formed with a leading face having a cutting edge capable of co-operating with a cutting edge of substantially the same contour forming part of a die so that when the leading face of the insert contacts a face of the rigid sheet of material and the article subjected to the action of a pressure applying device and die with at least the insert interposed between the pressure applying device and sheet of material, pressure applied to the article by the pressure applying device causes a piece of material of substantially the same contour as

the cutting edge of the insert to be sheared from the sheet material and at least part of the insert following the cutting edge thereof to be forced into the place of the piece of material, this following part of the insert having its exterior peripheral wall so formed as to be capable of keying to the walls of the sheet material bounding the aperture in the sheet material formed as a result of shearing out a piece of material therefrom, and also being shorter than the thickness of the sheet material and separated from the leading face by a surface having a peripheral recess of such a formation that material displaced by the passage of the insert through the sheet material can flow back into the peripheral recess to assist in anchoring the insert in the sheet material.

This technique is recommended for the mechanical fixing aspects discussed in co-pending Application No. 22268/58 (Serial No. 869,037). Its use is not recommended in the case of slotted inserts and inserts where the leading face is preceded into the sheet material by a spigot. It is also more relevant to heavy duty mechanical fixing such as securing metal inserts in metal sheets, such as for example steel plate or sheet, because a material such as steel would tend to relax more readily into the peripheral recess than would, say, a more brittle material such as a synthetic bonded laminate.

The preferred form of peripheral recess is a taper starting and being widest at the end of the following part nearest the leading face and terminating and being narrowest a short distance from the leading face. The narrowest part of the taper is preferably separate from the leading face by a smooth wall section of uniform cross section and comparable in extent to the widest part of the taper.

For and on behalf of
BELLING & LEE LIMITED,
C. RUSSELL TOWNEND,
 Secretary.

893,996

1 SHEET

COMPLETE SPECIFICATION

*This drawing is a reproduction of
the Original on a reduced scale.*

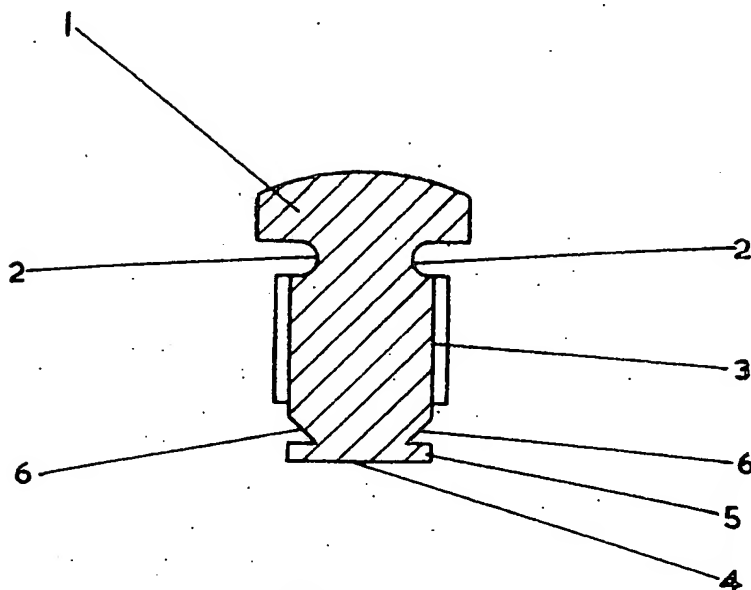


FIG. 1.

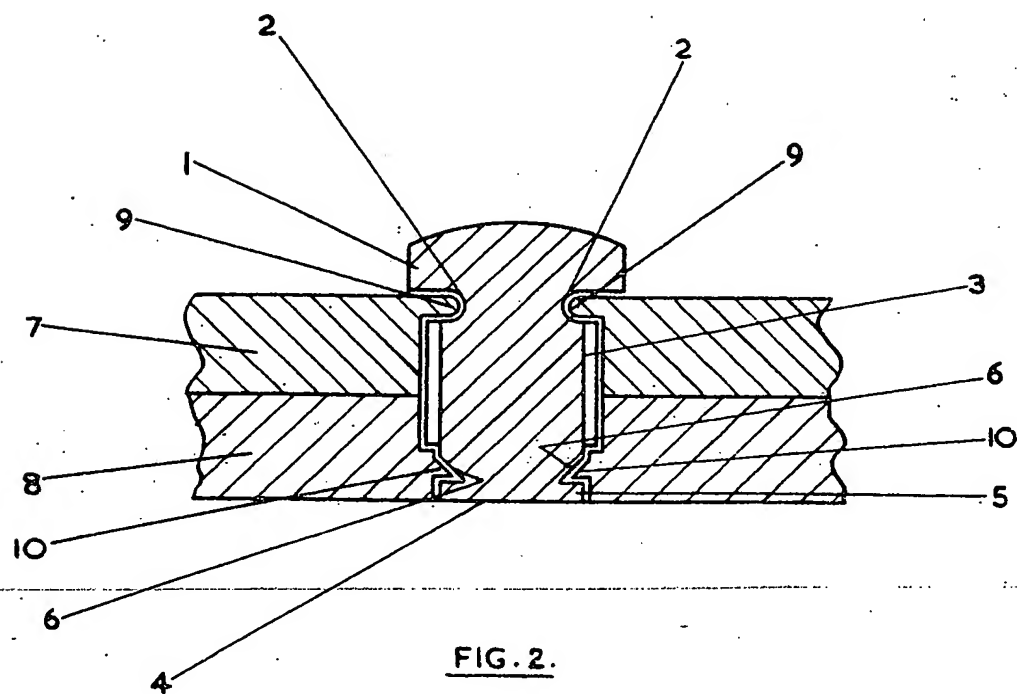


FIG. 2.